

EXECUTIVE SUMMARY

A baseline human health risk assessment (HHRA) has been conducted for the Ocoee River in Polk County, Tennessee, in support of the ongoing Remedial Investigation/Feasibility Study. The purpose of the HHRA was to evaluate the potential current and future adverse human health effects caused by releases of hazardous substances to the Ocoee River in the absence of any actions to control or mitigate these releases.

Sediment, surface water, and fish tissue samples were collected during 1997, 2000, and 2002 sampling events; analytical data were sorted by medium and river reach. Five potential human exposure areas were identified: Parksville Reservoir, the Whitewater Reach, Ocoee No. 3 Reservoir, the Copper Basin Reach, and a Reference Reach (Toccoa River). Chemicals of potential concern (COPCs) were identified in each medium and exposure area. COPCs included PCBs, arsenic, iron, lead, and manganese in sediment; arsenic, iron, lead, and manganese in surface water; and PCBs, mercury, and selenium in fish tissue.

An exposure assessment was conducted to identify receptors at risk and to estimate the type and magnitude of exposures. Exposure scenarios were quantified for area residents, recreational visitors, rafting guides, and recreational fishers. Exposure routes include incidental ingestion of sediment and surface water, dermal contact with sediment and surface water, and fish consumption. Reasonable maximum exposure estimates for each exposure scenario were combined with toxicity values to estimate noncancer hazard and cancer risk.

Human health hazards and risks associated with exposure to sediment and surface water did not exceed acceptable levels at any of the exposure areas. Risks from fish consumption could potentially exceed acceptable levels, depending on the fish consumption rate. Because no site-specific data on fish consumption rates are available for the Ocoee River, risks were quantified for a range of consumption rates.

Potentially unacceptable levels of noncancer health hazards are associated with consumption of locally-caught fish at consumption rates above 4.5 fish meals per month (30 g/day), due to the presence of mercury in fish tissue. The highest noncancer hazard is predicted for Ocoee No. 3 Reservoir. Potentially unacceptable levels of cancer risk are associated with consumption of locally caught fish at consumption rates above 1.5 fish meals per month (10 g/day) of channel catfish from Parksville Reservoir, due to the presence of PCBs.

A study in eastern Tennessee (Jakes *et al.* 1998a) reported that recreational anglers consume an average of four meals of reservoir fish per year (or about 0.3 meals per month). Ocoee River anglers would need to consume more than five times as many meals of channel catfish or 15 times as many meals of largemouth bass or yellow perch before an unacceptable cancer risk or noncancer hazard would be predicted.

Analysis of limited PCB congener data suggests similar cancer risk estimates as described above, with the exception that estimated cancer risks are a factor of 2 to 5 higher when dioxin-like PCB congeners are explicitly evaluated. Cancer risks may exceed the target range in Parksville Reservoir at consumption rates as low as 3 g/day (0.5 meals per month).

8.0 CONCLUSIONS

Exposures to contaminants in sediment and surface water of the Ocoee River are not predicted to result in unacceptable levels of health risk to area residents, recreational visitors, or whitewater rafting guides. No chemicals of concern were identified in Ocoee River sediment or surface water (i.e., cancer risk levels did not exceed 10^{-4} and noncancer hazard indices did not exceed 1 for any health effect).

Potentially unacceptable levels of noncancer health hazards are associated with consumption of locally-caught fish at consumption rates above 30 g/day (or about 4.5 fish meals per month, assuming a 7-ounce meal). Mercury in fish tissue may cause adverse health effects at the following rates of consumption:

- Parksville Reservoir – eastern segment: >40 g/day (6 meals per month)
- Parksville Reservoir – western segment: >50 g/day (about 7.5 meals per month)
- Baker/Indian Creek Inlet area: >60 g/day (9 meals per month)
- Ocoee No. 3 Reservoir: >30 g/day (4.5 meals per month)
- Copper Basin Reach: >60 g/day (9 meals per month)

The exposure point concentrations (EPCs) for mercury in Ocoee River fish tissue range from 0.20 to 0.31 mg/kg; these values are below the 0.4 mg/kg screening level recommended by EPA in their *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories* (EPA 2000c).

Potentially unacceptable levels of cancer risk are associated with consumption of locally-caught fish at consumption rates above 10 g/day (or about 1.5 fish meals per month, assuming a 7-ounce meal). PCBs in fish tissue may result in cancer risks above the target range of $1\text{E-}6$ to $1\text{E-}4$ at the following rates of consumption:

- Parksville Reservoir – eastern segment: >10 g/day channel catfish (1.5 meals per month), or >80 g/day largemouth bass (12 meals per month)
- Parksville Reservoir – western segment: >30 g/day channel catfish only (4.5 meals per month)
- Baker/Indian Creek Inlet area: >40 g/day channel catfish only (6 meals per month)
- Ocoee No. 3 Reservoir: no risks above the target range, even at very high consumption rates
- Copper Basin Reach: no risks above the target range, even at very high consumption rates

The EPCs for PCBs, ranging from 0.37 to 0.97 mg/kg, exceed the 0.02 mg/kg screening level by a factor of up to 50. (Note that the EPA fish advisory screening level is based on a cancer risk of $1\text{E-}5$ and a fish consumption rate of 17.5 g/day.)

Tables 8-1 and 8-2 summarize the results of the Baseline HHRA, as specified in EPA Region 4 guidance (EPA 2000a).

No site-specific data on fish consumption rates are available for the Ocoee River. However, anecdotal evidence and informal surveys indicate that fish consumption rates, particularly for channel catfish, are low. Channel catfish is not as popular a game fish as bass and perch, and catfish caught in Parksville Reservoir are not likely to be consumed in significant quantities. A study in eastern Tennessee (Jakus *et al.* 1998a) reported that recreational anglers consume an average of four meals of reservoir fish per year (or about 0.3 meals per month). Ocoee River anglers would need to consume more than five times as many meals of channel catfish or 15 times as many meals of largemouth bass or yellow perch before an unacceptable cancer risk or noncancer hazard would be predicted.

Analysis of limited PCB congener data suggests similar cancer risk estimates as described above, with the exception that estimated cancer risks are a factor of 2 to 5 higher when dioxin-like PCB congeners are explicitly evaluated. Cancer risks may exceed the target range in Parksville Reservoir at consumption rates as low as 3 g/day (0.5 meals per month). In Ocoee No. 3 Reservoir and the Copper Basin Reach, total cancer risks are estimated at 1E-4, the upper limit of the target range, at a fish consumption rate of 54 g/day (8 meals per month).